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RELATIVE ABUNDANCE AND DIVERSITY OF ROSACEAE FROM PROTECTED PARKS IN NORTHERN AREAS OF PAKISTAN

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ABSTRACT

The Rosaceae family is also considered as the rose family. There are 27 genera and nearly 160 species from this family in Pakistan. This study was carried out to determine the diversity and population size of species belonging to the Rosaceae family in selected national parks from Azad Jammu and Kashmir, Pakistan. Unbiased stage-sampling was carried out. Four species belonging to the Rosaceae family were observed in Banjosa Game Reserve. *Rosa brunonii* and *Duchesnea indica* present, were not enough to calculate relative abundance. Only two species from this family were recorded from Dhirkot National Park, *Rubus fruticosus* and *Fragaria nubicola*. Pir Chanasi National Park and Tolipir National Park had the most diversity out of all the National Parks surveyed.

Keywords: Rose, musk, budimewa, angiosperm, peach

INTRODUCTION

Yashasvi (n.d.) describe the Rosaceae family as the rose family with a global distribution. This family consists of more than 3000 species. Strawberries, quince, blackberry and raspberry are famous components of this family. Singh (2014) describe the health benefits of gulkand, an ayurvedic preparation of rose petals that helps in various ailments that include digestive issues and may also be used as an antidepressant. The species from this family are usually used for their ornamental value and wood from the Quince tree is considered good for walking sticks. Landrein et al. (n.d.) cite the presence of 27 genera and nearly 160 species from this family in Pakistan. This study was carried out to determine the diversity and population size of species belonging to the Rosaceae family in selected national parks from Azad Jammu and Kashmir, Pakistan.

MATERIALS AND METHODS

Unbiased stage-sampling was carried out. Zones having similar habitat conditions called the stands were identified. Each vegetative layer (herbs, shrubs and trees) was subjected to transect sampling.

The plants were identified in the field. The classification was confirmed using literary sources of Flora of Pakistan (Landrein et al., 2009). The specimens of all representative species plants were collected, pressed in newspapers, and were brought back to the laboratory. The preserved specimens of plants were identified following Flora of Pakistan (Nasir and Ali, 1970-2008; Stewart, 1972; Toshiyuki and Malik, 1992, 1993).

The transect data was used to develop the vegetative cover occupied in different plant species and transect covers were pooled to develop estimates on the cover occupied by the different plant species in the area (Table 9). The stand data was subject to computer-based ordination to develop communities based upon the stand

similarities in the vegetative composition. The distribution of different phytosociological communities was placed on the map of BGR. The relative distribution of plant communities and major species of plants were mapped. The possible use of the plant species was determined through the information from the local population and through the literature searched.

Plant cover occupied by each species was calculated by dividing the total length shared by each plant species by the length of the transect line (50 m) and converted into the percentage.

The constancy appearance of each species was calculated by the number of transects having the species divided by the total number of transects studied in each

stand and expressed in percentage. Each species was assigned one of the five constancy classes (class I = < 21 %, II = 21 - 40, III = 41-60, IV = 61-80, V = > 80) following Muller-Dombois and Ellenberg (1974).

The data on the absolute cover occupied by different species in a total of 51 transect samples were analyzed through Cluster Analysis (CA), using PC - ORD version 4.16, 1999 software. The groups of transects, having reasonable similarity in the species composition and cover, were identified using ordination achieved through Cluster Analysis. Each of the groups was recognized as a plant community and was named after the plant species contributing the significant cover.

RESULTS

Table 1. List of vascular plant species recorded from Banjosa Game Reserve

| # | Scientific Names | Remarks | Usage |
|---------------|---|---|---|
| Trees | | | |
| 1. | <i>Pyrus pashia</i> (Butangi) | Wild, Medium sized, white flowers appear along with the young leaves. Flowering March-April. | Edible fruits, wood as fuel. |
| Shrubs | | | |
| 2. | <i>Rosa brunonii</i> (Chal, Tarni, Musk, Rose) | Tall climber, white flowers, mostly in temperate zone, climb on tall trees in Coniferous Forest, attractive fragrance. Flowering April-June. | Goats and sheep grazing. |
| 3. | <i>Rubus fruticosus</i> (Garachey) | Prickly shrub in sub tropical Chir-pine zone, prickles stout, leaves 5-15 cm long, stipules 5 mm long, flowers pink 8-18 mm across in terminal panicles. flowering May – September. | Old leaves for diarrhea & fever, edible fruit. |
| 4. | <i>Rubus niveus</i> (Garachey) | Robust prickly shrub, branches ascending and 3-foliolate leaves, 12-15 mm broad white flowers. | Edible fruit; fresh extract of leaves for urticaria; old leaves for diarrhoea, fever and as diuretic; roots for dysentery, colic pains and whooping coughs. |
| Herbs | | | |

| | | | |
|----|---------------------------------------|--|---------------------------------|
| 1. | <i>Duchesnea indica</i> (Budimewa) | Perennial spreading herb, reddish runners, red tasteless fruits, fleshy receptacles yellow flowers. Fl.Per: March- October & Flowering March – May | Grazed by cattle, edible fruit. |
|----|---------------------------------------|--|---------------------------------|

Table 2. Relative vegetative cover of trees (% \pm) shared between different plant species in different vegetative types established in BGR by Ward's method.

| Names | Vegetative layer (Tress) | | | | | | Constancy | |
|-------------------|--------------------------|--------------------------------------|-------------------|--|--------------|--|-----------|-------|
| | A (10, 40-41, 44-45) | B (5, 11, 13, 16, 19, 22, 24, 48) | C (25, 35, 43) | D (2-3, 6-7, 17-18, 20, 27-29, 31-32, 36, 46) | E (8, 12) | F (1,4, 9, 14-15, 21, 23, 26, 30, 33, 34, 37-39, 42, 47, 49-51) | | |
| | AV \pm S.E | AV \pm S.E | AV \pm S.E | AV \pm S.E | AV \pm S.E | AV \pm S.E | % | Class |
| Trees | | | | | | | | |
| <i>Pyrus</i> | 2.29 \pm | 1.20 \pm | 0.65 \pm | 0.64 \pm | - | 0.46 \pm 0.23 | 17.65 | I |
| <i>pashia</i> | 2.05 | 0.84 | 0.65 | 0.64 | | | | |
| Shrubs | | | | | | | | |
| <i>Rubus</i> | - | - | - | 0.32 \pm | - | 0.34 \pm 0.14 | 19.61 | I |
| <i>niveus</i> | | | | 0.19 | | | | |
| Herbs | | | | | | | | |
| <i>Rubus</i> | 0.15 \pm | 0.15 \pm | - | 0.01 \pm | 0.42 \pm | 0.02 \pm 0.01 | 23.53 | II |
| <i>fruticosus</i> | 0.11 | 0.08 | | 0.01 | 0.19 | | | |





c



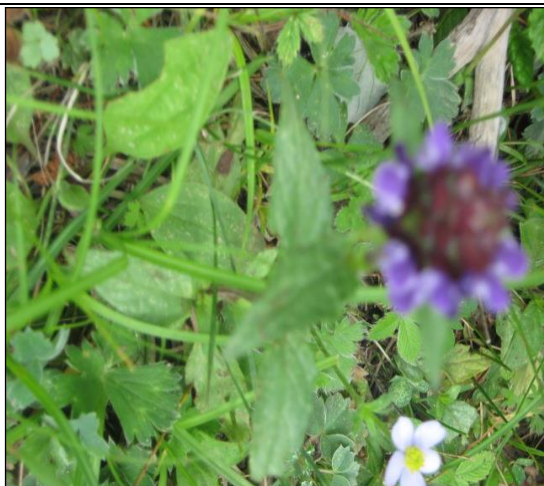
d



e



f



g



h



Figure 1. (a) *Pyrus pashia* (b) *Rosa brunonii* (c) *Rubus fruticosus* (d) *Rubus niveus* (e) *Duchesnea indica* (f) *Fragaria nubicola* (g) *Potentilla nepalensis* (h) *Rubus* sp. (i) *Potentilla reptans* (j) *Spirea affinis* (k) *Eriobotrya japonica* (l) *Spiraea canescens*

Table 3. List of plant species list identified from Dhirkot

| # | Scientific Names | Remarks |
|---------------|---|--|
| Shrubs | | |
| 1. | <i>Rubus fruticosus</i> (Chal) | Common shrub in 1000-1700 m. Very common hedges. |
| Herbs | | |
| 1. | <i>Fragaria nubicola</i> (Budi mava, wild strawberry) | Very common in temperate and sub alpine zone. Locally gathered by inhabitant and sold in market. |

Table 4: Relative vegetative cover (% \pm) shared between different plant species in different vegetative types established in DNR by Ward's method.

| Species | Vegetative Type | | | | | | Constancy (%) |
|--------------------------|-----------------|---|--------------|-----------------|------|-------------|---------------|
| | A | B1 | B2 | C | D1 | D2 | |
| | (1, 15, 22) | (4, 7, 12, 16, 18, 20, 9, 21, 17,10,11, 26, 27, 28) | (23, 24, 25) | (8, 19, 13, 14) | (2) | (3, 5, 6) | |
| <i>Fragaria nubicola</i> | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (0.07+0.07) | 18.92 |

Table 5. List of plant species list identified from PCNP

| # | Scientific Names | Remarks | Usage |
|---------------|------------------------------------|--|--|
| Trees | | | |
| 1. | <i>Pyrus pashia</i> (Butangi) | Medium sized, with white flowers that appear along with the young leaves. | Fruits edible and wood used as fuel; medicinal (eye complaints). |
| Shrubs | | | |
| 1. | <i>Rubus fruticosus</i> (Garachey) | Prickly, found in sub-tropical Chir-pine zone in semi slope area, prickles stout, leaves 5-15 cm long; stipules 5 mm long; leaflets, flowers pink 8-18 mm across in terminal panicles; flowers: May – September. | Leaf as tea, against diarrhea, diuretic, leaf poultice for wounds/ insect bites, oily skin wash. |
| 2. | <i>Rubus niveus</i> | 1–2.5 m, stems whitish tomentose at first, becoming glabrous green to purple later; leaves pinnate with 5–11 leaflets and 1–4 cm broad, dark green above, densely pale grey to white tomentose beneath, flowers 1 cm diameter, five dark pink- red petals. | Edible fruit |
| 3. | <i>Spiraea</i> spp. | - | Ornamental. |
| 4. | <i>Spiraea canescens</i> | Up to 3 m, in the summer it assumes a white coloring, not evergreen. | Walking sticks. |
| 5 | <i>Spiraea affinis</i> | 1-2 m, leaves elliptic-obovate, a pointed tip and toothed margins, flowers borne in spreading corymbs, rose color, flowers 6-8 mm across, petals pinkish, rarely white, nearly circular, longer than sepals. | Edible, herbal tea, stomach disorders treatment. |
| Herbs | | | |
| 1. | <i>Fragaria nubicola</i> | Perennial, reddish runners, trifoliate leaves fleshy receptacles yellow | Grazed by cattles, edible fruit. |

| | | | |
|----|------------------------------|--|---|
| | (budimeva, Wild Strawberry) | flowers, subglobose, red and tasteless fruit; flower: April – June. | |
| 2. | <i>Potentilla argentea</i> | Perennial, stems numerous, 15-30cm, grayish-woolly-hairy. 5-10 per stem, upper surface greenish, lower surface grayish-woolly-hairy. Flowers compound cluster, with leafy bracts at the lower nodes. Petals 5, yellow. Flowering: June-July. | Used in medicine, treat diarrhea, can be grown as ornamental pants. |
| 3. | <i>Potentilla nepalensis</i> | Strawberry-like leaves, bearing branches of cup-shaped flowers, beginning in early summer. | Treats burns, starchy root edible. |
| 4. | <i>Potentilla reptans</i> | Bears solitary flowers, long, in axils, and half-erect, large flowers, sepals being alternately smaller. | In stomach complaints/dysentery, tanning, tea for fever. |
| 5. | <i>Sibbaldia purpurea</i> | Perennial, woody based, rhizome much branched, flower stems ascending, 4–10 cm tall, appressed pilose, radical leaves 1.5–4 cm including petiole appressed pilose. | Ornamental. |

Table 6: Relative vegetative cover (% ±) shared between different plant species in different vegetative types established in PCNP by Ward's method.

| # | Names | Vegetative Types | | | Constancy (%) / class |
|--------|------------------------------|--------------------------------------|---|---|-----------------------|
| | | A | B | C | |
| | | (9, 20 ,23, 38-39, 44-46, 53-55, 60) | (3, 34, 16, 56, 7, 59, 61, 35, 36, 37, 8, 43, 47, 40, 13, 24, 32, 42, 48, 25, 29, 31, 26, 28, 27, 33, 30, 49, 50, 51, 64, 63, 52) | (2, 18, 14, 62, 10, 11, 21, 22, 12, 41, 57, 58, 15, 1, 19, 4, 5, 6, 17, 65) | |
| Trees | | | | | |
| 1 | <i>Pyrus pashia</i> | 0±0 | 0.1±0.1 | 0±0 | 1.5/(I) |
| Shrubs | | | | | |
| 1. | <i>Spirea</i> spp. | 0.1±0.1 | 0.1±0.1 | 0.1±0.1 | 6.2/(I) |
| Herbs | | | | | |
| 1. | <i>Fragaria nubicola</i> | 0±0 | 0±0 | 0±0 | 1.5/(I) |
| 2. | <i>Potentilla nepalensis</i> | 0±0 | 0.1±0.0 | 0±0 | 6.2/(I) |
| 3. | <i>Potentilla</i> spp. | 0.1±0.0 | 0.1±0.0 | 0.1±0.0 | 24.6/(II) |

| | | | | | |
|----|----------------------------|---------|-----|---------|----------|
| 4. | <i>Potentilla argentea</i> | 0.2±0.2 | 0±0 | 0.3±0.1 | 12.3/(I) |
| 5. | <i>Sibbaldia purpurea</i> | 0.1±0.1 | 0±0 | 0.1±0.0 | 10.8/(I) |

Table 7. List of plant species list identified from PLNP

| # | Scientific Names | Remarks | Usage |
|---------------|---|--|---|
| Trees | | | |
| 1. | <i>Eriobotrya japonica</i> | Small tree. Rounded crown, short trunk and woolly new twigs, can grow to 5–10 m, often 3–4 m, leaves alternate, simple, 10–25 cm long, dark green, tough and leathery in texture, with a serrated margin, and densely velvety-hairy below with thick yellow-brown pubescence; the young leaves are also densely pubescent above, but this soon rubs off. | Eaten as a fresh fruit, salads, jam, jelly, and chutney, and are often served poached in light syrup. |
| 2. | <i>Pyrus pashia</i> <i>Ham.ex.D.Don</i> (Butangi) | Medium sized, with white flowers that appear along with the young leaves. | Fruits edible and wood used as fuel; medicinal (eye complaints). |
| 3. | <i>Prunus persica</i> (Linn.) <i>Batch</i> (Aru, Peach) | Medium sized, up to 8 m, stem erect, branched, woody with grey to red bark; flowers pink with five sepals and five petals; fruit drupe, fleshy and downy, enclosing a hard furrowed one- seeded stone. | Leaves remove maggots from wounds in cattle and dogs, as fodder, firewood, fruit edible, unripe used in chutneys. |
| Shrubs | | | |
| 1. | <i>Rosa brunonii</i> (Chal, Tarni, Musk Rose) | Tall, white flowers, climb on tall trees in coniferous Forest, attractive fragrance. | Flowers in skin and eye diseases, as heart tonic, fodder. |
| 2. | <i>Rubus niveus</i> <i>Thumb</i> | 1–2.5 m, stems whitish tomentose at first, becoming glabrous green to purple later; leaves pinnate with 5–11 leaflets and 1–4 cm broad, dark green above, densely pale grey to white tomentose beneath, flowers 1 cm diameter, five dark pink- red petals. | Edible fruit |
| 3. | <i>Rubus sanctus</i> (Garachey) | - | Fruit edible, wound healing, infected insect bites, pimples. |
| 4. | <i>Spirea canescens</i> <i>D.Don</i> (Gangeri) | 1-5 m tall, with arching grey-haired branches, leaves small, elliptic-obovate, entire or have 3-5 teeth at the apex, | Edible, herbal tea, stomach disorders treatment. |

| | | | |
|----|-----------------------|--|--|
| 5. | <i>Spirea affinis</i> | hairy, flowers white, 4-6 mm across, numerous dense flat-topped clusters. 1-2 m, leaves elliptic-obovate, a pointed tip and toothed margins, flowers borne in spreading corymbs, rose color, flowers 6-8 mm across, petals pinkish, rarely white, nearly circular, longer than sepals. | Edible, herbal tea, stomach disorders treatment. |
|----|-----------------------|--|--|

Table 8: Relative vegetative cover (% \pm) shared between different plant species in different vegetative types established in PLNP by Ward's method.

| Names | Vegetative Types | | | | Constancy (%) / class |
|-------------------------|--|--|--------------------------------------|--|-----------------------|
| | A (1, 3, 19, 33-35, 36, 38, 46, 47, 48, 49, 50, 56, 57, 60, 68) | B (4, 5, 7, 8, 9, 10, 12, 13, 17, 21, 22, 23, 25, 26, 29, 31, 32, 37, 40, 41, 42, 43, 44, 52, 54) | C (2, 16, 18, 28, 30, 45, 53, 59) | D (6, 11, 14, 15, 20, 24, 27, 39, 55) | |
| | Mean \pm S.E | Mean \pm S.E | Mean \pm S.E | Mean \pm S.E | |
| | 13.14 | 21.56 | 46.58 | 29.08 | |
| Trees | | | | | |
| <i>Pyrus pashia</i> | 0.6 \pm 0.30 | 0.8 \pm 0.23 | 0.7 \pm 0.4 | 0.5 \pm 0.2 | 43.3/ (III) |
| <i>Prunus persica</i> | 0.0 \pm 0.0 | 0.1 \pm 0.1 | 0.0 \pm 0.0 | 0.0 \pm 0.0 | 1.6/ (I) |
| Shrubs | | | | | |
| <i>Rosa brunonii</i> | 0.0 \pm 0.0 | 0.5 \pm 0.2 | 0.0 \pm 0.0 | 0.0 \pm 0.0 | 11.6/ (I) |
| <i>Spirea canesaens</i> | 0.1 \pm 0.1 | 0.2 \pm 0.1 | 0.1 \pm 0.1 | 0.1 \pm 0.1 | 11.6/ (I) |
| <i>Rubus sanctus</i> | 0.0 \pm 0.0 | 0.0 \pm 0.0 | 0.0 \pm 0.0 | 0.1 \pm 0.1 | 6.6/ (I) |

Table 9. List of plant species list identified from TNP

| # | Scientific Names | Remarks | Usage |
|--------------|-------------------------------------|---|---|
| Trees | | | |
| 1. | <i>Eriobotrya japonica</i> (Loquat) | Cultivated in the sub-Himalayan zone and adjacent plains. | Fruit edible, slightly acid, sweet aromatic flavor, they can be eaten out of hand or cooked in pies, sauces, jellies etc. The roasted seed is a coffee substitute |

| | | | |
|---------------|---|--|---|
| 2. | <i>Prunus armeniaca</i> Linn. (Hari, Khubani, Apricot) | Medium sized, up to 15 m tall, stem erect, branched, woody with dark bark. | Leaves simple, flesh of the fruit dried, fruit and seeds edible, oil extracted for burning. |
| 3. | <i>Prunus domestica</i> Linn. (Lucha, Alu bukhara) | Small deciduous tree reaching 9-12 m in height | Useful for irregular menstruation, debility, miscarriage, fruit can be eaten fresh, canned, or dried, used for alcoholic beverage, liqueurs, hard wood furniture manufacture. |
| 4. | <i>Prunus persica</i> (Linn.) Batch (Aru, Peach) | Medium sized, up to 8 m tall, stem erect, branched, woody with grey to red bark, flowers pink with five sepals and five petals, fruit drupe, fleshy and downy, enclosing a hard furrowed one seeded stone. | Leaves used to kill intestinal worms, remove maggots from wounds in cattle and dogs, as fodder for cattle, goats, sheep, as firewood, fruit edible, unripe fruit used in chutneys. |
| 5. | <i>Pyrus malu</i> Linn. | Easily grown plant, succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil. | Low antigen content diet, useful in the management of immune-mediated diseases such as mixed cryoglobulinemia. |
| 6. | <i>Pyrus pashia</i> Ham.ex.D.Don (Butangi) | Common medium sized, with white flowers that appear along with the young leaves. | Fruits edible and wood used as fuel. Medicinal (Eye complaints); edible; fuel; fodder |
| Shrubs | | | |
| 1. | <i>Rosa brunonii</i> (Chal, Tarni, Musk Rose) | Tall, with white flowers, climb on tall trees in Coniferous Forest, attractive fragrance, grazed by goats and sheep. | Flowers used in skin and eye diseases, recommended by indigenous people in biliousness, flowers as heart tonic. |
| 2. | <i>Rubus fruticosus</i> (Garachey) | Prickly, found in sub-tropical Chir-pine zone in semi slope area, prickles stout, leaves 5-15 cm long; stipules 5 mm long; leaflets, flowers pink 8-18 mm | Old leaves used in case of diarrhea, fever, fruit eaten by local inhabitants. |

| | | | |
|--------------|--|--|---|
| | | across in terminal panicles. Flowering: May – September. | |
| 3. | <i>Rubus niveus</i> (Garachey) | Robust, prickly, branches ascending, 3-foliolate leaves, flowers white, 12-15 mm broad. | Fruit delicious and edible, fresh extract of leaves in urticaria, old leaves in case of Diarrhea, fever and as diuretic, decoction of root in dysentery, colic pains and whooping coughs. |
| Herbs | | | |
| 1. | <i>Duchesnea indica</i> (Budimewa) | Perennial herb with reddish runners, red fruits tasteless and flowers yellow, with fleshy receptacles. Flowering: March-October. | Fruit edible but tasteless, fodder for cattle. |
| 2. | <i>Fragaria nubicola</i> (Budi meva, Wild Strawberry) | Common, flower in the temperate and subalpine zones. | Fruit edible and gathered by locals for sale. |

Table 10: Relative vegetative cover (% \pm) shared between different plant species in different vegetative types established in TNP by Ward's method.

| Species | Vegetative Type | | | | | Constancy | |
|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------|-------|
| | A | B | C | D | E | % | Class |
| | AV \pm S.E | AV \pm S.E | AV \pm S.E | AV \pm S.E | AV \pm S.E | | |
| Trees | | | | | | | |
| <i>Pyrus</i> | - | - | - | - | 0.06 \pm | 5.77 | I |
| <i>malus</i> | | | | | 0.03 | | |
| <i>Pyrus</i> | 0.62 \pm | 0.21 \pm | - | - | 0.30 \pm | 9.61 | I |
| <i>pashia</i> | 0.16 | 0.10 | | | 0.12 | | |
| Shrubs | | | | | | | |
| <i>Rosa</i> | - | 0.46 \pm | - | - | - | 38.46 | II |
| <i>brunonii</i> | | 0.22 | | | | | |
| <i>Rubus</i> | - | 0.05 \pm | - | - | - | 21.15 | II |
| <i>fruticosus</i> | | 0.04 | | | | | |
| Herbs | | | | | | | |
| <i>Fragaria</i> | - | - | - | - | 0.01 \pm | 32.69 | II |
| <i>nubicloa</i> | | | | | 0.01 | | |

DISCUSSION

Survey carried out in BGR through May-June 2009 suggested presence of 5 species belonging to the Rosaceae family. The number of plant species reported in the present study is expected to increase with some more detailed future sampling of the flora of the study sites, carried out in different parts of the year. In BGR only one tree species, one herb, and 3 shrubs were recorded. Only *Rubus fruticosus* had enough numbers present to be classified in class II, *Pyrus Pashia* and *Rubus niveus* belonged to class I. *Rosa brunonii* and *Duchesnea indica* present, were not enough to calculate relative abundance. Only two species from this family were recorded from Dhirkot National Park, *Rubus fruticosus* and *Fragaria nubicola*. Pir Chanasi National Park and Tolipir National Park had the most diversity out of all the National Parks surveyed.

The present sampling was undertaken during specific seasons, and hence may not include monsoon ephemerals from some areas for example. The present list mainly presents the diversity of the perennials or deciduous plant species, which can maintain them even during harsh winter, though it may include some of the spring ephemerals. The result suggests that some species appeared in the transect sampling, while the rest of the species (minimum of 47) did not appear in the present sampling, having very rare distribution in certain very specific micro-habitat conditions.

Hussain et al. (2016) report the presence of twenty-two species from the Rosaceae family in Rawalakot, Azad Jammu and Kashmir. The species observed were more. The time period for survey was longer, from 2009 to 2012. Akhtar and Begum

(2009) conducted a study in Jalala Mardan and observed the presence of *Prunus persica* from the family Rosaceae. A variety of fruits and other vegetation belonging to this family was reported from Nandiar Khuwarr (Haq et al., 2011). In their survey from 2008 to 2010, Haq et al. (2011) observed the presence of *Cotoneaster nummularia*, *Crataegus songarica*, *Fragaria nubicola*, *Pyrus pashia*, *Prunus padus*, *Rosa muschata*, *Rubus fruticosus* and *Rubus ulmifolius*.

CONCLUSION

Four species belonging to the Rosaceae family were observed in Banjosa Game Reserve. *Rosa brunonii* and *Duchesnea indica* present, were not enough to calculate relative abundance. Only two species from this family were recorded from Dhirkot National Park, *Rubus fruticosus* and *Fragaria nubicola*. Pir Chanasi National Park and Tolipir National Park had the most diversity out of all the National Parks surveyed.

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